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# *A Case of Tumor of the Cervical Region of the Spine. Operation and Death.*

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# A CASE OF TUMOR OF THE CERVICAL REGION OF THE SPINE. OPERATION AND DEATH.[1]

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## Medical Report by Dr. Lloyd.

This patient was admitted into the writer's wards at the Philadelphia Hospital as a simple case of hemiplegia of several months' duration, and as such cases abound there, and as she did not present obtrusively any special symptoms, several days elapsed before she was prominently brought to my notice. The resident physician, Dr. Talley, then called my attention to the fact that the patient had stiffness of the neck, pain on moving the parts, and a slight prominence on the left side of the spine at about the level of the third cervical vertebra. The following history was elicited:

Catharine W., aged about forty-five years, native of Germany. No history of tubercle, alcoholism, or syphilis obtainable. Four months before her admission to the hospital she said that she had a burning pain in her head. About this time the left leg became weak and she gradually lost power in it. The left arm then began to lose power. It was not stated by the patient very accurately how long after the leg the arm became paretic, but it was a period of some weeks. As in the case of the leg, the paresis of the arm was gradual in its approach until the limb was quite paralyzed. There was not, and never had been, any paresis of the face or tongue. For some time (period not accurately stated) before the appearance of any paretic symptoms the patient had noticed a slight swelling or tumor on the back of the neck immediately to the left of the median line, and corresponding to the third cervical vertebra. The neck was stiff. During sleep she said that her arm "jerked."

Her condition at the time of the first examination was as follows: The left arm was paretic and slightly wasted (?). The left leg was paralyzed, slightly spastic, and gave well-marked ankle clonus and rectus clonus. The patellar reflexes were very much exaggerated in both legs.

[1] Read before the American Neurological Association, at the meeting of the Congress of American Physicians and Surgeons, Washington, D. C., September, 1888.

The muscles of the affected limbs gave no changes to electric excitation. The right arm and leg were positively normal in their motor functions to the most rigid tests, but there was slight ankle clonus on that side, not nearly so great as on the affected, or left, side. There was no anæsthesia anywhere. Mindful that this was a case in which crossed anæsthesia and paresis might exist, I examined the patient's right (sound) arm and leg with the greatest care again and again, but no tests demonstrated any loss of sensation. The same was true of the left (affected) side. There were no subjective symptoms of altered sensibility (paræsthesia), nor to heat or pain. There was no paralysis of any facial, ocular, or lingual muscles of either side, nor any alteration of sensation in these regions. The pupillary reflexes to light and accommodation were normal. She had a marked swelling on the back of the neck, referred to above. It was slightly sensitive to pressure, and seemed very deep-seated. She was very positive in her statement that the tumor in the neck came on four months before the paralytic symptoms, and that these paralytic symptoms came on gradually, beginning in the leg, and afterward involving the arm. She had had intense pain in the cervical region. Dr. de Schweinitz examined the eye-grounds, and found evidence of a slight retinitis in each eye. There were no vasomotor or trophic disturbances.

In consultation with Dr. John B. Deaver the case was again carefully examined and the tumor was considered to be probably a growth from the inside of the spinal canal, extending outward, and slightly compressing the cord. As the cord-compression was yet very limited in area, only involving the left lateral tract, while threatening every day to invade new territory with fatal results, and as the woman was already badly disabled, it was decided that an exploratory incision should be made. This opinion was endorsed, at a subsequent consultation, by Dr. D. Hayes Agnew, who kindly saw the case. The operation was accordingly performed July 17, 1888, by Dr. Deaver, in the presence of Drs. Agnew, Ashhurst, and Mills.

The details of the operation are given by Dr. Deaver in his paper. The laminæ of the third and fourth cervical vertebræ were cut through and the spinous processes removed, thus exposing the theca. The swelling on the side of the spine was found to be thickened and somewhat displaced bony tissue of the vertebra. The bones were evidently the seat of an inflammatory process, and were softer than normal.

The dura mater was thickened and opaque. There was no bulging or swelling within it. As there was no indication for more interference, it was decided not to open the membranes, and accordingly the operation proceeded no further. To all appearances, the whole of the pathological process had been confined to the bones and to the soft parts without. Evidence was altogether lacking in the operation itself of what the exact condition had been which caused such circumscribed pressure upon the cord as only to impinge upon the left motor tract. The respiration of the patient was altered during the latter part of the operation, and again before her death three days later. This alteration consisted in deep, almost gasping inspirations with quite a prolonged interval between. Whether this was caused by any interference with the functions of the phrenic nerve, which is described by some as originating in the fourth cervical segment, I am not able to say. It ceased as the patient rallied from the ether, but returned again a few hours before her death.

The patient's paralysis after the operation did not improve. Her

arm and leg were tested as carefully as her condition would admit; she was very weak, but evidently made an unsuccessful effort to throw the palsied limbs into motion when requested to do so. On the third day after the operation her condition changed for the worse, the respiration was altered as described, she became unconscious and died. It would be difficult to explain exactly the mechanism (so to speak) of her death. It was not expected up to a short time before her end. The surgical conditions were aseptic and good. There was no increase of pressure upon the cord; at least there were no new paralytic symptoms to indicate such. The wound had ample drainage. The alteration in the respiration alone seemed to furnish an explanation.

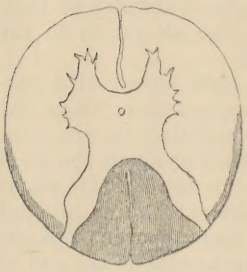
The notes of the *autopsy* are as follows: The cord presented a perfectly normal appearance up to the region of the operation, where the dura was slightly thickened and congested. On splitting up the dura there was observed on the anterior aspect of the cord at about the level of the second cervical nerves a slight prominence on the left side about five-eighths of an an inch below the decussation of the pyramidal tracts. This prominence was of the same color and apparent consistence as the cord, was somewhat conical, and about the size of the end of a wheat grain. The cord was not cut, but preserved for microscopic examination. Careful examination of the external and internal capsules of both the right and left hemispheres and of the motor tracts through the crura and pons revealed a perfectly normal condition. At the base of the brain the membranes were not involved, and the basilar and other arteries, including the arteria hemorrhagica and middle cerebral, were not atheromatous. The ventricles contained a normal amount of fluid without blood. The centrum ovale was normal, as was the motor cortex to naked eye inspection. The kidneys showed a slight tendency to congestion and to interstitial change.

I am indebted to Dr. E. O. Shakespeare for the following report on the pathological appearances of the sections of the cord which he made:

Three segments of the cord were examined—the one above the lesion, the one containing the lesion, and the next one below. The top of the upper segment shows oil globules in the posterior columns and in the cerebellar tracts. Below in this segment is a circumscribed lesion involving the gray matter from the middle line forward as far as the beginning of the anterior horn and back to one-half the length of the posterior horn; it also involves the crossed pyramidal tracts; also slightly involves the multipolar cells in the anterior horn. An upper section from the middle segment involves the gray matter beginning about at the posterior edge of the central canal back to the edge of the gray commissure, and involving the posterior left horn and the outer border of the gray matter extending into the anterior horn of the left side; the whole of the left lateral column is involved at this level, including, of course, the motor tracts. The posterior root zone is here also slightly involved. There is a small area of involvement on the right side in the anterior column; also slight at exit of the right anterior nerves. The middle sections of the middle segment show unilateral involvement of the gray matter (left side) and limited involvement of the trophic cells on the right side. The anterior part of the columns of Burdach is involved. The whole of the lateral

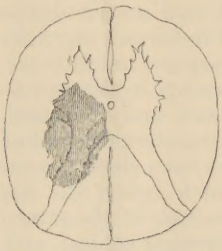
column is involved (this section corresponding to the level of the projection seen post-mortem), and on the anterior part is an intensification of the lesion. The lower section of the middle segment involves about the same as the last, except that the column of Burdach is involved further back. The right anterior horn is slightly involved, also a limited islet in the right column of Burdach near the column of Clark. Middle of

FIG. 1.



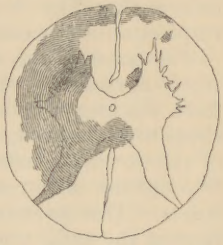
Three-quarters inch above projection, showing area of ascending degeneration.

FIG. 2.



Above projection, showing area of hemorrhagic extravasation.

FIG. 3.

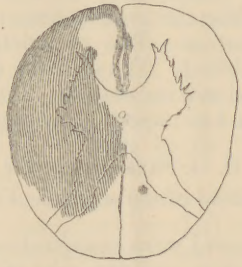


Still above projection, showing area of hemorrhagic extravasation.

FIG. 4.

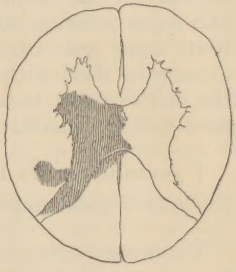
Top of projection, showing projection and area of hemorrhagic extravasation.

FIG. 5



Little below projection, showing area of hemorrhagic extravasation.

FIG. 6.



Bottom of middle segment, showing area of hemorrhagic extravasation.

lower segment shows the lesions limited sharply to the gray matter of the left side posterior to the central canal, anterior parts of the posterior horns, and the crossed pyramidal tracts. The lesion consists, in the main, of an extravasation of blood with a more or less complete destruction of the gray and white matter involved. There is also some inflammatory action principally in the neighborhood of the peripheral portions of the hemorrhage.

OBSERVATIONS.—The present appears to be an era of operative interference in diseases of the cerebro-spinal system. It is well, therefore, to publish both the unsuccessful and successful cases. From the former is sometimes learned more than from the latter. This case, it now appears, was beyond the aid of surgery. The lesion was too far anterior, and too deep in the substance of the cord itself to be reached by the

knife. It was, at least, an instance of successful localization of a lesion in the cord. The manner of the patient's death creates a suspicion that the phrenic was in some way interfered with; and this may serve as a possible danger-signal to those who are about to operate upon the cervical spine. On the other hand, it must be remembered that in our case the bones were involved in an inflammatory process.

### Surgical Report by Dr. Deaver.

*July 16, 1888.* The day previous to the operation, the patient's bowels were moved with a saline purgative; the urine examined chemically and microscopically, proving to be negative; and the heart and lungs carefully examined, eliciting no organic trouble. She was given first a warm water bath, then a boric acid bath, after which the neck was washed with turpentine, then scrubbed with soap and water, again washed with ether, alcohol, and enveloped with a towel wrung out of a solution of 1 : 1000 bichloride of mercury.

*Operation, 17th,* 1 P. M. The patient having been etherized, was placed upon the table, and with Prof. D. Hayes Agnew and Prof. John Ashhurst, Jr., assisting, and in the presence of Drs. J. Hendrie Lloyd and Charles K. Mills, I made a longitudinal incision over the median line of the nape of the neck, extending a little distance above and below and down to the spines of the affected vertebræ; then separated the muscular attachment and reflected the soft parts laterally on either side as far as the junction of the transverse processes with the pedicles of the vertebræ, thus clearing the spinous processes, as well as the laminæ of the third and fourth cervical vertebræ and their ligamentous attachments, when was exposed a bony tumor, convex from above downward and from side to side, being much greater upon the left side The soft parts thus far dealt with were, macroscopically at least, normal.

The spinous processes were removed at their base with a pair of bone pliers, then the laminæ on each side were divided behind the articular processes with the same instrument. Upon making the section of the spinous processes, they were found to be a trifle softened, while the laminæ, particularly on the left side, the side corresponding to the most prominent part of the tumor, were softened and enlarged, the cancellous tissue of same containing some pus; in other words, the condition was that of chronic ostitis with perhaps some osteo-myelitis. Upon the removal of the laminæ, which were adherent to the dura mater, the dura mater was seen intact at the bottom of the wound, the connective tissue normally existing here having been absorbed; neither were there any bloodvessels present (the posterior longitudinal spinal veins and their connecting branches, which exist here normally, being absent). The dura mater did not rise up into the bottom of the wound when the bone was removed; it presented an opaque appearance and was quite resisting to the sense of touch, and appeared thickened, having shared in the inflammation of the bone. It was opened with an exploring needle, with purely negative results, and was tougher than normal.

The operation, so far as removing any more tissue, was completed and it remained to readjust, fix, and dress the soft parts.

A rubber drainage-tube (medium size) was placed in the wound, the

muscles and the deep fascia covering them sewed with catgut, and the skin and superficial fascia with silver wire. The wound was dressed antiseptically, first dusting on iodoform, covering with protective, wet with a solution of 1 : 2000 of bichloride of mercury, twelve layers of bichloride gauze wrung out of a solution of 1 : 2000 of bichloride of mercury, twelve layers of dry bichloride gauze, these covered with bichloride cotton, and, lastly, with an antiseptic bandage. During the operation the strictest antisepsis was observed, the wound being continually irrigated with a solution of 1 : 4000 of bichloride of mercury. Immediately after the operation the temperature and pulse were normal, the respiration being of the character described by Dr. Lloyd.

Patient sent back to ward; ordered application of dry heat to body and extremities; ammonium carbonate, grains five every two hours; milk and lime-water.

4 P. M., after the operation, the temperature was 97°, respiration 21, pulse 104. 6.30 P. M., temperature 96⅖°, pulse 92, respiration 28.

*18th.* Patient passed quite a comfortable night and seemed as well as before operation; mind perfectly clear; pulse 80, respiration 28, temperature 99⅖°; dressings examined and found to be dry and in position. The respiration being of the same character as spoken of above, I did not think it injudicious to order $\frac{1}{150}$th of a grain of sulphate of atropia hypodermatically twice daily.

*19th.* The patient's breathing becoming more laborious, and her general condition alarming the resident physician, I was summoned to go to the hospital. Upon my arrival, at 12 M., the condition was as follows: pulse 100, respiration 32, temperature 99⅘°. The respirations being quite shallow, electricity was applied; one pole over the side of neck corresponding to the origin of the phrenic nerve; the other, to the lower margin of the chest, with the idea of stimulating the diaphragm. I ordered the ammonium carbonate and the atropia to be continued, with the addition of one-half ounce of whiskey every two hours. The dressing being slightly soiled, I dressed the wound, when I found it healed except the track containing the drainage tube; there being no discharge from this, I removed it and washed out the track with a solution of 1 : 2000 bichloride of mercury.

*20th.* No improvement; respiration 40, pulse 150, temperature 100⅘°. Thinking that her condition might be partly due to pressure from collection in the bottom of the wound, I removed the dressings, took out two stitches, broke up the union and, examining the wound very carefully, I found it to be clear; I, therefore, dressed it and ordered the treatment continued.

Patient died the following morning at 4.30.

The cause of death I attributed to inhibition of the phrenic centre, there being no other possible explanation at which I could arrive.

My reasons for attributing the cause of death to phrenic inhibition are that, prior to the operation, the respirations were normal, and that during the early part of the operation nothing abnormal was noted in the breathing, but at the latter part it was noticed to be changed and answering to the description given by Dr. Lloyd. The only explanation I can give for this is, that the spinal cord about the position of the

phrenic centre might possibly have been injured with the exploring needle, or by some other condition not recognized. The operation, up to the time of introducing the needle, could not in any way have injured the cord, as the dura mater was in no way interfered with, with the exception of separating it from the adherent laminæ when it was left intact at the bottom of the wound, and the needle passed through it to determine whether or not there was any further mischief. In the future, if I have the opportunity to operate upon the cervical portion of the spinal cord, I certainly will not use the exploring needle as a means of diagnosis, but, in preference, will lay open the dura mater and expose to inspection the deeper parts; this being, to my mind, a cleaner, more satisfactory, and, to the patient, a less dangerous procedure. In operations upon the cord in its remaining regions the use of the exploring needle would not be so objectionable. I believe this is the first time in this country that an operation has been undertaken with the view of removing a spinal cord tumor, and that but two other surgeons elsewhere have preceded me, namely, Mr. Macewen and Mr. Horsley. Mr. Macewen's cases were not really tumors of the cord, but of the connective tissue between the dura mater and the spinal canal. In view of my again meeting with a similar case, I certainly would advise operative interference carried to the extent of exploration at least, which shall determine the advisability of proceeding further, and I do not consider that the result here obtained should discourage us at all in furthering the good work already done upon the cerebro-spinal axis.